

REMARKS

Claims 1-21 are pending in the application. Claim 21 is withdrawn from consideration.
Claims 1-20 are rejected.

Claim Rejections - 35 U.S.C. §103(a)

Claims 1-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over EP1152036 to Kanda et al. in view of U.S. Patent No. 5,173,393 to Sezi et al.

The Examiner asserts that the differences between the claims and Kanda et al. are:
Kanda et al. does not disclose applying a first surfactant on the resist pattern to be thickened;
Kanda et al. does not disclose that the resist pattern is heated after applying the surfactant; Kanda et al. does not disclose that the surfactant composition includes a solvent that does not dissolve the resist pattern to be thickened, and that the solvent is water (claims 4-5); Kanda et al. does not disclose that the surfactant composition is a metal-free surfactant such as non-ionic surfactant and is selected from the group recited in claim 9 (claims 6, 8-9); Kanda et al. does not disclose that the ArF resist material is selected from the group recited in claim 19.

The Examiner concludes that it would have been obvious to modify Kanda et al. by employing the process of treating the resist pattern to be thickened with a surfactant solution as suggested by Sezi et al. because Sezi et al., in col. 7, lines 3-8, and in col. 8., lines 38-55, discloses that the resultant photoresist structure has an increased etch resistance and is therefore suitable to be used as an etch resistant mask. The Examiner further concludes that it would have been obvious to modify Kanda et al. by employing the resist pattern material suggested by Sezi

et al. because Sezi et al., in col. 4, lines 44-55, discloses that the resist material used for forming the photoresist structure includes groups such as anhydrides that do not exhibit an increased absorption of DUV light.

Claim 20 is rejected under 35 U.S.C. §103(a) as being unpatentable over Kanda et al. in view of Sezi et al. The Examiner asserts that the only difference between claim 20 and Kanda et al. is that Kanda et al. does not disclose applying a surfactant composition that has a first surfactant on the resist pattern to be thickened.

The Examiner notes that Sezi et al., in col. 7, lines 30-58, discloses that the photoresist structure is treated with a reactant that comprises isopropyl alcohol (non-ionic surfactant) and has a solvent such as water (that does not dissolve the resist pattern). The Examiner concludes that it would have been obvious to modify Kanda et al. by employing the process of treating the resist pattern to be thickened with a surfactant solution as suggested by Sezi et al. because Sezi et al., in col. 7, lines 3-8, and in col. 8, lines 38-55, discloses that the resultant photoresist structure has an increased etch resistance and is therefore suitable to be used as an etch resistant mask.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Finally, there must be a reasonable expectation of success. (Manual of Patent Examining Procedure §2142). The teaching or suggestion to make the

claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure.

Applicants respectfully disagree with the above rejection because there is no reasonable suggestion for one skilled in the art to have combined the above cited references.

The Examiner concludes that it would have been obvious to modify Kanda et al. by employing the process of treating the resist pattern to be thickened with a surfactant solution as suggested by Sezi et al. because Sezi et al., in col. 7, lines 3-8, and in col. 8., lines 38-55, discloses that treating a photoresist structure with solution composed of one weight part 3-(aminomethyl)-benzylamine, 1 weight part aminomethylnaphthaline, 49 weight parts isopropyl alcohol, and 49 weight parts water results in a photoresist with an increased etch resistance which is therefore suitable to be used as an etch resistant mask.

The Examiner is apparently asserting that one skilled in the art would have used the above solution of Sezi et al. on the resist pattern of the present invention in order to produce a photoresist having increased etch resistance.

However, Applicants submit that one skilled in the art would not have used the cited solution of Sezi et al. on the resist pattern of the present invention in order to produce a photoresist having increased etch resistance.

Applicants note that the solution of Sezi et al. is described as increasing the resistance of the treated photoresist layer to etching to a single etchant: halogen-containing etching plasma (abstract; column 1, line 19; column 1, line 43; column 3, line 36; column 4, line 42; column 6, line 38; column 6, line 56; column 7, line 6; column 8, line 56). There is no teaching that this

treatment of Sezi et al. is useful for increasing etch resistance to any other etching medium besides halogen-containing etching plasma. Therefore, one skilled in the art would have the suggestion that the solution of Sezi et al. increases the resistance of a treated photoresist layer to etching by halogen-containing etching plasma.

Further, Applicants note that the photoresist of Kanda et al. is described as a novolak resin (paragraph [0021]). However, the photoresist of Sezi et al. describes that novolak resins are unsuitable for its purposes (column 2, lines 2-7). Thus described, the treatment composition of Sezi et al. is unsuitable for the photoresist resin of Kanda et al. Therefore, one skilled in the art would not have looked to combine the treatment of Sezi et al. with the process of Kanda et al.

Finally, Applicants note that neither Kanda et al. nor Sezi et al. disclose or suggest that when the surfactant composition is applied to the resist pattern to be thickened, the first surfactant contained in the surfactant composition penetrates the resist pattern to be thickened to thereby improve the affinity of a surface of the resist pattern to be thickened for the resist pattern thickening material. Then according to the present invention, the resist pattern thickening material is applied thereonto, and a portion of the applied resist pattern thickening material present near the interface with the resist pattern to be thickened very easily penetrates the resist pattern to be thickened and is then mixed with the material of the resist pattern to be thickened to form a mixed layer. In this procedure, the surface of the resist pattern to be thickened has a satisfactorily improved affinity for the resist pattern thickening material, and the resist pattern thickening material uniformly and easily penetrates to form the mixed layer easily. Therefore, the resist pattern to be thickened is efficiently thickened by the resist pattern thickening material.

Application No. 10/720,097
Attorney Docket No. 032132

Response under 37 C.F.R. §1.111
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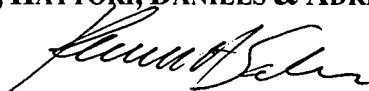
In view of the aforementioned remarks, Applicants submit that the claims are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP



Kenneth H. Salen

Attorney for Applicants
Registration No. 43,077
Telephone: (202) 822-1100
Facsimile: (202) 822-1111

KHS/klf